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Ontario health officials race to avert ‘take off’ of new COVID-19 variants

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Two health care workers gown up on the sidewalk before going into Meighen Manor seniors home in Toronto on April 20, 2020.

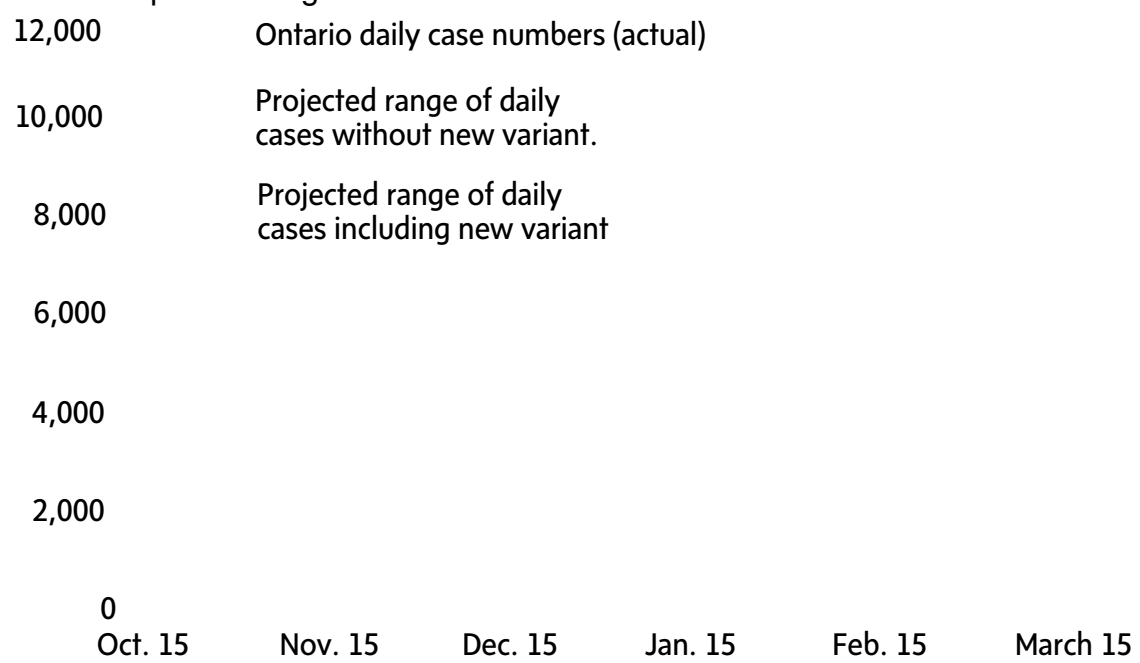
FRANK GUNN/THE CANADIAN PRESS

Ontario is bracing for a perilous inflection point in the COVID-19 pandemic, which a mathematical model projects could result from a new variant of the virus that is showing up in the province.

According to the projection, released during a news briefing on Tuesday, the variant is poised to rapidly inflate case numbers and overwhelm emergency rooms in the province based on its behaviour in other locations. The projection helps explain why Ontario has issued a provincewide stay-at-home order beginning Thursday.

NEW THREAT

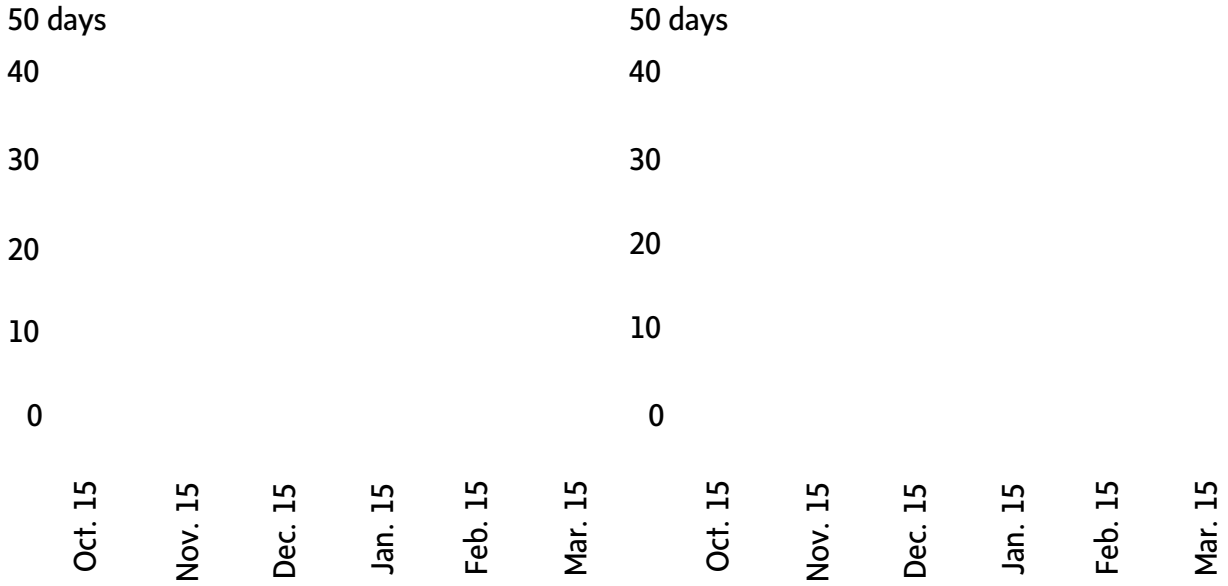
A mathematical model shows the potential impact in Ontario of a single introduction of the B.1.1.7 (British) variant of the virus that causes COVID-19. Starting with an arrival on Oct. 15, the variant dies out by chance in roughly two thirds of all simulations. The rest of the time it takes off (red), inflating daily case numbers well beyond the expected range (blue) within three to four months. Each new introduction of the variant by a traveller has the potential to trigger the same pattern after an equivalent lag time.



DOUBLING TIME

Currently, the number of new cases in Ontario is doubling about every 45 days. If the B.1.1.7 variant takes off, the doubling time may shrink to 10 days and remain there while the variant becomes the dominant cause of infection.

Assuming variant introduced Oct. 15 **Assuming variant introduced Dec. 15**



IVAN SEMENIUK AND JOHN SOPINSKI/THE GLOBE AND MAIL
SOURCE: QUEEN'S UNIVERSITY; PROVINCE OF ONTARIO

Cases in Ontario now already number in the vicinity of 4,000 a day, leaving little room for a further burden on resources if an additional caseload from the variant is overlaid on top of that. In a worst-case scenario, the projection shows an eruption of the variant in Ontario could push that number into the tens of thousands of new cases per day in a few weeks’ time, long before vaccines can be deployed to help blunt the impact.

“I think we’re at a place where we don’t have a lot of choice. We need to reduce contacts,” said Beate Sander, an epidemiologist with the University Health Network in Toronto. She co-chairs a group of experts that works with provincial health officials on modelling the pandemic.

The variant, known as B.1.1.7, was first detected in Britain in December. Evidence is mounting that it is somewhere in the range of 50 per cent more transmissible than more common versions of the virus.

The B.1.1.7 variant is showing up in Canada as targeted genomic sequencing of positive cases, including travellers and other groups, has increased. Quebec has so far spotted only one case. Last week, Alberta and British Columbia had seven new variant cases between them, including the first report of a variant from South Africa that is different from B.1.1.7 but also appears to transmit more readily. However, Ontario is well ahead of all other provinces combined.

As of Tuesday, the province has 14 cases of the B.1.1.7 variant. Significantly, three of those have not been directly linked to a traveller returning from Britain or elsewhere.

“If that’s confirmed, then we have evidence of community transmission, and that is a very serious concern,” said Barbara Yaffe, associate chief medical officer of health for Ontario, during the briefing.

The Ontario modelling around the variant was started in December by Troy Day, a mathematical biologist at Queen’s University in Kingston.

Using the properties of the B.1.1.7 variant derived from British epidemiological data, Dr. Day created a simulation in which one case of the variant is introduced into Ontario on Oct. 15 last year and then is allowed to spread undetected. In repeated runs of the simulation, the variant often dies out because it cannot infect enough people in time to sustain itself. However, in about one third of the runs, the variant manages to gain a foothold in the population.

“There’s a period where it kind of bumbles along, not really growing. Then it starts to take off,” Dr. Day said.

The model shows the “takeoff” generally occurs at three to four months. At that point the variant begins to quickly outpace the older version of the virus and causes a rapid escalation in total case counts. If there was such an October introduction, that would mean the variant would be starting to have a significant effect now. For introductions at a later time, the pattern is the same but shifted forward in time. Each new introduction represents another roll of the dice with a one-third chance of reaching takeoff.

“We’re sort of in the same situation we were in last year with the pandemic in general,” Dr. Day said. “We were tracking people [with positive cases] coming in as travellers ... and then all of the sudden it wasn’t just travellers and off it went. I worry that’s going to happen with this too.”

The model also shows that once the variant is spreading widely, the time it takes for new cases to double in Ontario accelerates dramatically from every 45 days to every 10 days, a staggering rate that would translate into roughly 3,000 new patients in need of ICU beds per day across the province by mid-February.

Dr. Day said the impact of the variant may be less if its rate of spread is somewhat lower than the British data suggest. The model also does not take into account the effects of keeping children out of schools and other measures that went into effect after Dec. 26.

There is no indication of new variants causing more severe cases of COVID-19. However, a higher number of cases overall would be expected to increase the total number of severe cases

and deaths in a population.

“The mode now is one of urgency. We’re trying to understand not only what’s happening but how do we get in front of this?” said Kumar Murty, director of the Fields Institute for Mathematical Research in Toronto, who has co-led the Ontario modelling group since was formed last March.

Dr. Murty added that an important take-away from the modelling is that public-health interventions, including mask-wearing, physical distancing and hand washing, remain the most effective deterrent against the virus.

“None of these [variants] can get through a mask,” he added. “That’s the single most powerful weapon all of us have in our hands.”

Dr. Kanna Vela has been treating COVID-19 patients in emergency departments in Ajax and Scarborough, Ontario for nearly 10 months. She lived apart from her family at the onset of the coronavirus pandemic. Receiving her first dose of the Pfizer-BioNTech vaccine in late December has given Dr. Vela some hope for the months ahead as hospitals struggle to care for the rise in COVID-19 cases.